



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TEXAS 75202-2733

July 9, 2015

(b) (6)

RE: Analytical results for samples collected by the U.S. Environmental Protection Agency (EPA) from your wells on October 23, 2014 and October 27, 2014 as part of the San Mateo Creek Basin Groundwater Investigation

Dear Mr. and Mrs. (b) (6):

The purpose of this letter is to provide you with the analytical results for water samples collected on your property by the EPA in October 2014. The water samples collected from your property were analyzed for various chemicals that are associated with historical mining and milling operations in your area.

Please see the enclosed documents for information on the results from the sample(s) collected from your wells which includes:

- a table comparing the analytical results to EPA and State of New Mexico human health standards;
- an ATSDR Uranium Fact Sheet; and
- 2 maps showing the location of the wells sampled.

EPA will be hosting a Grants Mining District community meeting on Thursday, August 13, 2015, at the Cibola County Building, 515 West High Street, Grants, New Mexico 87020. EPA will be available starting at 5:00 p.m. to answer any questions you may have regarding your results prior to the official start of the community meeting.

Thank you for your participation in the well sampling program. EPA continues to review information and investigate groundwater quality in the area. Well owners may be contacted for permission to conduct follow-up or confirmatory well sampling as necessary.

Please contact me at 214-665-6666 or via email at turner.ladonna@epa.gov if you have any questions.

Sincerely,

LaDonna Turner
Superfund
Risk and Site Assessment Section

Enclosures:

San Mateo Creek Basin Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	PV01-20141023-21 10/23/2014 Field Sample
Dissolved Metals					
Aluminum	mg/L	NA	NP	--	0.22 UJK
Antimony	mg/L	NA	NP	--	0.037 UJK
Arsenic	mg/L	NA	NP	--	0.018 UJK
Barium	mg/L	NA	NP	--	0.021 UJK
Beryllium	mg/L	NA	NP	--	0.0028 UJK
Boron	mg/L	NA	NP	--	2.2 JK
Cadmium	mg/L	NA	0.01	--	0.0034 UJK
Calcium	mg/L	NA	NP	--	12 JK
Chromium	mg/L	NA	0.05	--	0.034 UJK
Cobalt	mg/L	NA	NP	--	0.027 UJK
Copper	mg/L	NA	1	--	0.021 UJK
Iron	mg/L	NA	1	--	0.13 UJK
Lead	mg/L	NA	0.05	--	0.006 UB
Magnesium	mg/L	NA	NP	--	0.93 JKQ
Manganese	mg/L	NA	0.2	--	0.01 UB
Mercury	mg/L	NA	0.002	--	0.000073 JKQ
Molybdenum	mg/L	NA	NP	--	0.039 JKQ
Nickel	mg/L	NA	NP	--	0.026 UJK
Phosphorus	mg/L	NA	NP	--	0.14 UJK
Potassium	mg/L	NA	NP	--	4.6 UJK
Selenium	mg/L	NA	0.05	--	0.021 UJK
Silicon	mg/L	NA	NP	--	4.8 JK
Silver	mg/L	NA	0.05	--	0.0099 UJK
Sodium	mg/L	NA	NP	--	680 JK
Thallium	mg/L	NA	NP	--	0.024 UJK
Tin	mg/L	NA	NP	--	0.05 UJK
Titanium	mg/L	NA	NP	--	0.013 UJK
Uranium	mg/L	NA	0.03	--	0.26 UB
Vanadium	mg/L	NA	NP	--	0.044 UJK
Zinc	mg/L	NA	10	--	0.083 UJK
Dissolved Uranium Re-Analysis					
Uranium	mg/L	NA	0.03	--	0.002 U
General Chemistry					
Alkalinity	mg/L	NP	NP	--	300
Bicarbonate Alkalinity as CaCO3	mg/L	NP	NP	--	300
Bromide	mg/L	NP	NP	--	1.5
Carbonate Alkalinity as CaCO3	mg/L	NP	NP	--	0.54 U
Chloride	mg/L	NP	250	--	480
Fluoride	mg/L	NP	1.6	--	1.8
Nitrate as N	mg/L	1	10	--	0.008 U
Nitrite as N	mg/L	1	NP	--	0.6 U
Orthophosphate	mg/L	NP	NP	--	0.16 U
pH	pH Units	6.5-8.5	6-9	--	8.34 JK
Sulfate	mg/L	250	600	--	630
Total Dissolved Solids	mg/L	500	1000	--	2200



San Mateo Creek Basin

Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	PV01-20141023-21 10/23/2014 Field Sample
Total Metals					
Aluminum	mg/L	NP	NA	--	0.22 U
Antimony	mg/L	0.006	NA	--	0.037 U
Arsenic	mg/L	0.01	NA	--	0.018 U
Barium	mg/L	2	NA	--	0.021 U
Beryllium	mg/L	0.004	NA	--	0.0028 U
Boron	mg/L	NP	NA	--	2.2
Cadmium	mg/L	0.005	NA	--	0.0034 U
Calcium	mg/L	NP	NA	--	13
Chromium	mg/L	0.1	NA	--	0.034 U
Cobalt	mg/L	NP	NA	--	0.027 U
Copper	mg/L	1.3	NA	--	0.021 U
Iron	mg/L	NP	NA	--	0.13 U
Lead	mg/L	0.015	NA	--	0.006 U
Magnesium	mg/L	NP	NA	--	1.1 JQ
Manganese	mg/L	NP	NA	--	0.01 UB
Mercury	mg/L	0.002	NA	--	0.00006 U
Molybdenum	mg/L	NP	NA	--	0.043 JQ
Nickel	mg/L	NP	NA	--	0.026 U
Phosphorus	mg/L	NP	NA	--	0.14 U
Potassium	mg/L	NP	NA	--	4.6 U
Selenium	mg/L	0.05	NA	--	0.021 U
Silicon	mg/L	NP	NA	--	4.3
Silver	mg/L	NP	NA	--	0.0099 U
Sodium	mg/L	NP	NA	--	730
Thallium	mg/L	0.002	NA	--	0.024 U
Tin	mg/L	NP	NA	--	0.05 U
Titanium	mg/L	NP	NA	--	0.013 U
Uranium	mg/L	0.03	NA	--	0.26 UJK
Vanadium	mg/L	NP	NA	--	0.044 U
Zinc	mg/L	NP	NA	--	0.083 U
Radiological					
Gross Alpha	pCi/L	15	NP	--	13 U G (+/- 8.13)
Gross Beta	pCi/L	NP	NP	--	7.6 U G (+/- 4.77)
Radium-226	pCi/L	5	30	--	0.261 (+/- 0.135)
Radium-228	pCi/L	5	30	--	0.721 (+/- 0.302)
Thorium-227	pCi/L	NP	NP	--	0.205 U (+/- 0.0951)
Thorium-228	pCi/L	NP	NP	--	0.254 U (+/- 0.0997)
Thorium-230	pCi/L	NP	NP	--	0.148 U (+/- 0.129)
Thorium-232	pCi/L	NP	NP	--	0.118 U (+/- 0.0528)
Uranium-233/234	pCi/L	NP	NP	--	3.63 (+/- 1.00)
Uranium-235/236	pCi/L	NP	NP	--	0.232 U (+/- 0.219)
Uranium-238	pCi/L	10	NP	--	0.322 U (+/- 0.251)
Total Uranium Re-Analysis					
Uranium	mg/L	0.03	NA	--	0.004 U



San Mateo Creek Basin

Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	SMC-09-20141027-21 10/27/2014 Field Sample
Dissolved Metals					
Aluminum	mg/L	NA	NP	--	0.47 JKQ
Antimony	mg/L	NA	NP	--	0.075 UJK
Arsenic	mg/L	NA	NP	--	0.036 UJK
Barium	mg/L	NA	NP	--	0.074 JQK
Beryllium	mg/L	NA	NP	--	0.0057 UJK
Boron	mg/L	NA	NP	--	0.14 UB
Cadmium	mg/L	NA	0.01	--	0.0067 UJK
Calcium	mg/L	NA	NP	--	55 JK
Chromium	mg/L	NA	0.05	--	0.067 UJK
Cobalt	mg/L	NA	NP	--	0.054 UJK
Copper	mg/L	NA	1	--	0.042 UB
Iron	mg/L	NA	1	--	0.29 JKQ
Lead	mg/L	NA	0.05	--	0.012 UJK
Magnesium	mg/L	NA	NP	--	7.5 JKQ
Manganese	mg/L	NA	0.2	--	0.02 UJK
Mercury	mg/L	NA	0.002	--	0.0003 UJK
Molybdenum	mg/L	NA	NP	--	0.038 UJK
Nickel	mg/L	NA	NP	--	0.051 UJK
Phosphorus	mg/L	NA	NP	--	0.28 UJK
Potassium	mg/L	NA	NP	--	9.1 UJK
Selenium	mg/L	NA	0.05	--	0.042 UJK
Silicon	mg/L	NA	NP	--	8.1 JK
Silver	mg/L	NA	0.05	--	0.02 UJK
Sodium	mg/L	NA	NP	--	81 JK
Thallium	mg/L	NA	NP	--	0.048 UJK
Tin	mg/L	NA	NP	--	0.1 UJK
Titanium	mg/L	NA	NP	--	0.025 UJK
Uranium	mg/L	NA	0.03	--	0.51 UB
Vanadium	mg/L	NA	NP	--	0.088 UJK
Zinc	mg/L	NA	10	--	0.17 UJK
Dissolved Uranium Re-Analysis					
Uranium	mg/L	NA	0.03	--	0.022
General Chemistry					
Alkalinity	mg/L	NP	NP	--	180
Bicarbonate Alkalinity as CaCO3	mg/L	NP	NP	--	180
Bromide	mg/L	NP	NP	--	0.39
Carbonate Alkalinity as CaCO3	mg/L	NP	NP	--	0.54 U
Chloride	mg/L	NP	250	--	29
Fluoride	mg/L	NP	1.6	--	1.3
Nitrate as N	mg/L	1	10	--	5.9
Nitrite as N	mg/L	1	NP	--	0.06 U
Orthophosphate	mg/L	NP	NP	--	0.078 U
pH	pH Units	6.5-8.5	6-9	--	7.83 JK
Sulfate	mg/L	250	600	--	140
Total Dissolved Solids	mg/L	500	1000	--	530



San Mateo Creek Basin

Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	SMC-09-20141027-21 10/27/2014 Field Sample
Total Metals					
Aluminum	mg/L	NP	NA	--	0.22 U
Antimony	mg/L	0.006	NA	--	0.037 U
Arsenic	mg/L	0.01	NA	--	0.018 U
Barium	mg/L	2	NA	--	0.075 JQ
Beryllium	mg/L	0.004	NA	--	0.0028 U
Boron	mg/L	NP	NA	--	0.072 UB
Cadmium	mg/L	0.005	NA	--	0.0034 U
Calcium	mg/L	NP	NA	--	69
Chromium	mg/L	0.1	NA	--	0.034 U
Cobalt	mg/L	NP	NA	--	0.027 U
Copper	mg/L	1.3	NA	--	0.021 U
Iron	mg/L	NP	NA	--	0.24 JQ
Lead	mg/L	0.015	NA	--	0.006 UB
Magnesium	mg/L	NP	NA	--	9.1 JQ
Manganese	mg/L	NP	NA	--	0.01 U
Mercury	mg/L	0.002	NA	--	0.00006 U
Molybdenum	mg/L	NP	NA	--	0.019 U
Nickel	mg/L	NP	NA	--	0.026 U
Phosphorus	mg/L	NP	NA	--	0.14 U
Potassium	mg/L	NP	NA	--	4.6 U
Selenium	mg/L	0.05	NA	--	0.021 U
Silicon	mg/L	NP	NA	--	9.4
Silver	mg/L	NP	NA	--	0.0099 U
Sodium	mg/L	NP	NA	--	100
Thallium	mg/L	0.002	NA	--	0.024 U
Tin	mg/L	NP	NA	--	0.05 U
Titanium	mg/L	NP	NA	--	0.013 U
Uranium	mg/L	0.03	NA	--	0.26 UB
Vanadium	mg/L	NP	NA	--	0.044 U
Zinc	mg/L	NP	NA	--	0.083 UB
Radiological					
Gross Alpha	pCi/L	15	NP	--	16.3 G (+/- 4.74)
Gross Beta	pCi/L	NP	NP	--	2.78 (+/- 1.84)
Radium-226	pCi/L	5	30	--	0.173 (+/- 0.117)
Radium-228	pCi/L	5	30	--	0.333 U (+/- 0.197)
Thorium-227	pCi/L	NP	NP	--	0.427 U (+/- 0.152)
Thorium-228	pCi/L	NP	NP	--	0.298 U (+/- 0.152)
Thorium-230	pCi/L	NP	NP	--	0.299 U * (+/- 0.172)
Thorium-232	pCi/L	NP	NP	--	0.265 U (+/- 0.123)
Uranium-233/234	pCi/L	NP	NP	--	6.79 (+/- 1.18)
Uranium-235/236	pCi/L	NP	NP	--	0.278 (+/- .240)
Uranium-238	pCi/L	10	NP	--	6.67 (+/- 1.17)
Total Uranium Re-Analysis					
Uranium	mg/L	0.03	NA	--	0.022



San Mateo Creek Basin

Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	SMC1052-20141023-21 10/23/2014 Field Sample
Dissolved Metals					
Aluminum	mg/L	NA	NP	--	0.22 UJK
Antimony	mg/L	NA	NP	--	0.037 UJK
Arsenic	mg/L	NA	NP	--	0.018 UJK
Barium	mg/L	NA	NP	--	0.021 UJK
Beryllium	mg/L	NA	NP	--	0.0028 UJK
Boron	mg/L	NA	NP	--	0.072 UB
Cadmium	mg/L	NA	0.01	--	0.0034 UJK
Calcium	mg/L	NA	NP	--	140 JK
Chromium	mg/L	NA	0.05	--	0.034 UJK
Cobalt	mg/L	NA	NP	--	0.027 UJK
Copper	mg/L	NA	1	--	0.021 UJK
Iron	mg/L	NA	1	--	0.13 UB
Lead	mg/L	NA	0.05	--	0.006 UJK
Magnesium	mg/L	NA	NP	--	33 JK
Manganese	mg/L	NA	0.2	--	0.01 UB
Mercury	mg/L	NA	0.002	--	0.00006 UJK
Molybdenum	mg/L	NA	NP	--	0.019 UJK
Nickel	mg/L	NA	NP	--	0.026 UJK
Phosphorus	mg/L	NA	NP	--	0.14 UJK
Potassium	mg/L	NA	NP	--	4.6 UJK
Selenium	mg/L	NA	0.05	--	0.021 UJK
Silicon	mg/L	NA	NP	--	2.3 JKQ
Silver	mg/L	NA	0.05	--	0.0099 UJK
Sodium	mg/L	NA	NP	--	310 JK
Thallium	mg/L	NA	NP	--	0.024 UJK
Tin	mg/L	NA	NP	--	0.05 UJK
Titanium	mg/L	NA	NP	--	0.013 UJK
Uranium	mg/L	NA	0.03	--	0.26 UB
Vanadium	mg/L	NA	NP	--	0.044 UJK
Zinc	mg/L	NA	10	--	0.083 UJK
Dissolved Uranium Re-Analysis					
Uranium	mg/L	NA	0.03	--	0.0044 J
General Chemistry					
Alkalinity	mg/L	NP	NP	--	46
Bicarbonate Alkalinity as CaCO3	mg/L	NP	NP	--	46
Bromide	mg/L	NP	NP	--	0.54
Carbonate Alkalinity as CaCO3	mg/L	NP	NP	--	0.54 U
Chloride	mg/L	NP	250	--	75
Fluoride	mg/L	NP	1.6	--	0.37
Nitrate as N	mg/L	1	10	--	0.16
Nitrite as N	mg/L	1	NP	--	0.06 U
Orthophosphate	mg/L	NP	NP	--	0.16 U
pH	pH Units	6.5-8.5	6-9	--	8.14 JK
Sulfate	mg/L	250	600	--	900
Total Dissolved Solids	mg/L	500	1000	--	1800



San Mateo Creek Basin

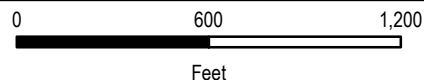
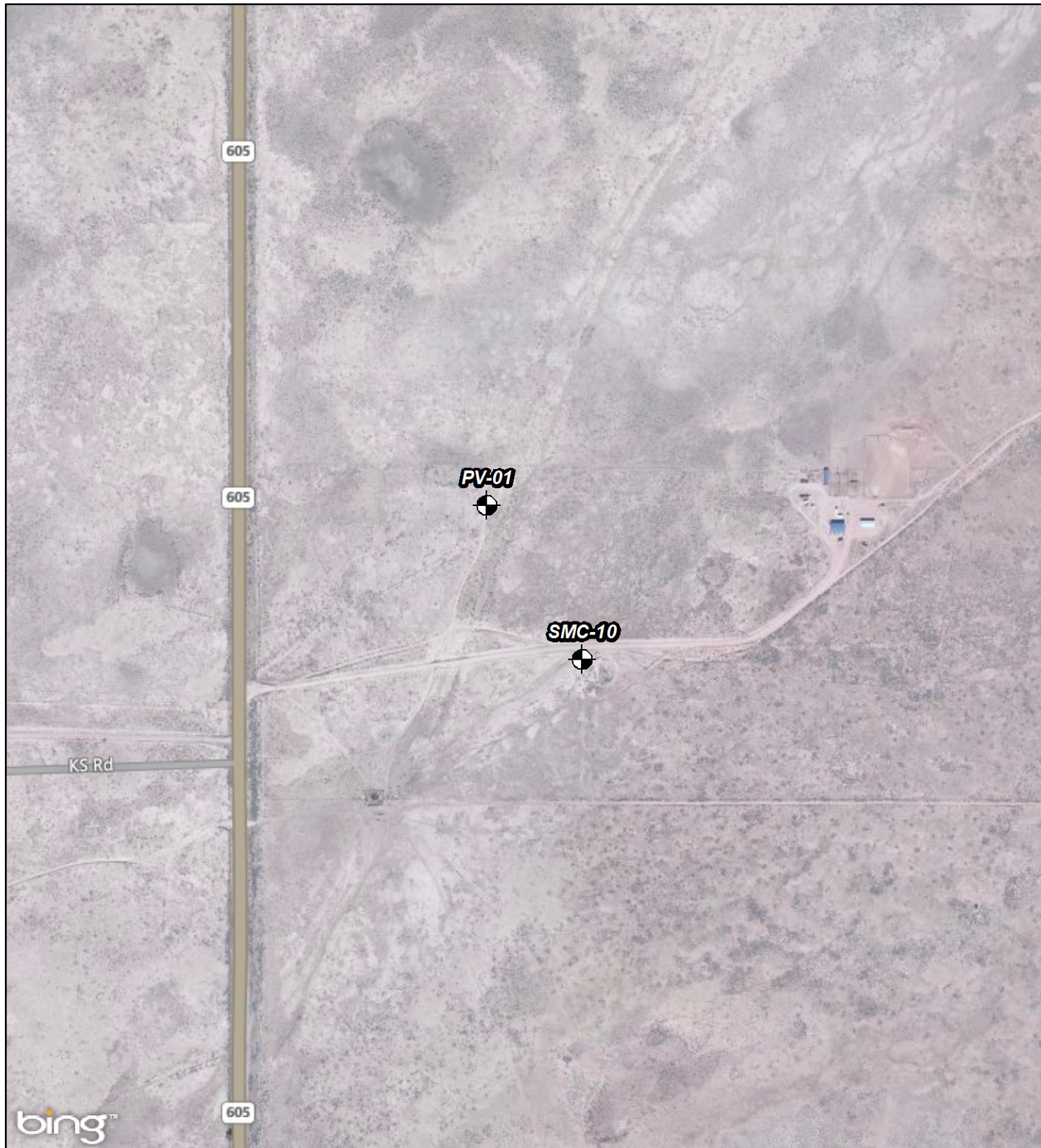
Phase I Water Analytical Results

Analyte	Units	EPA National Primary Drinking Water Standard Maximum Contaminant Level (MCL)	New Mexico Water Quality Control Commission (NMWQCC)	Sample ID Date Type	SMC1052-20141023-21 10/23/2014 Field Sample
Total Metals					
Aluminum	mg/L	NP	NA	--	1.1 JQ
Antimony	mg/L	0.006	NA	--	0.037 U
Arsenic	mg/L	0.01	NA	--	0.018 U
Barium	mg/L	2	NA	--	0.021 UB
Beryllium	mg/L	0.004	NA	--	0.0028 U
Boron	mg/L	NP	NA	--	0.072 UB
Cadmium	mg/L	0.005	NA	--	0.0034 U
Calcium	mg/L	NP	NA	--	150
Chromium	mg/L	0.1	NA	--	0.034 U
Cobalt	mg/L	NP	NA	--	0.027 U
Copper	mg/L	1.3	NA	--	0.021 U
Iron	mg/L	NP	NA	--	17
Lead	mg/L	0.015	NA	--	0.006 U
Magnesium	mg/L	NP	NA	--	35
Manganese	mg/L	NP	NA	--	0.01 UB
Mercury	mg/L	0.002	NA	--	0.00006 U
Molybdenum	mg/L	NP	NA	--	0.019 U
Nickel	mg/L	NP	NA	--	0.026 U
Phosphorus	mg/L	NP	NA	--	0.14 U
Potassium	mg/L	NP	NA	--	4.6 U
Selenium	mg/L	0.05	NA	--	0.021 U
Silicon	mg/L	NP	NA	--	7.1
Silver	mg/L	NP	NA	--	0.0099 U
Sodium	mg/L	NP	NA	--	300
Thallium	mg/L	0.002	NA	--	0.024 U
Tin	mg/L	NP	NA	--	0.05 U
Titanium	mg/L	NP	NA	--	0.013 JQ
Uranium	mg/L	0.03	NA	--	0.26 UJK
Vanadium	mg/L	NP	NA	--	0.044 U
Zinc	mg/L	NP	NA	--	0.088 JQ
Radiological					
Gross Alpha	pCi/L	15	NP	--	9.7 U G (+/- 6.73)
Gross Beta	pCi/L	NP	NP	--	5.4 U G (+/- 3.14)
Radium-226	pCi/L	5	30	--	0.183 U (+/- 0.113)
Radium-228	pCi/L	5	30	--	0.429 U (+/- 0.246)
Thorium-227	pCi/L	NP	NP	--	0.205 U (+/- 0.0836)
Thorium-228	pCi/L	NP	NP	--	0.255 U (+/- 0.131)
Thorium-230	pCi/L	NP	NP	--	0.222 (+/- 0.158)
Thorium-232	pCi/L	NP	NP	--	0.0828 U (+/- 0.0782)
Uranium-233/234	pCi/L	NP	NP	--	1.95 (+/- 0.448)
Uranium-235/236	pCi/L	NP	NP	--	0.138 (+/- 0.124)
Uranium-238	pCi/L	10	NP	--	1.22 (+/- 0.344)
Total Uranium Re-Analysis					
Uranium	mg/L	0.03	NA	--	0.0041 J


Notes:

U - Analyte not detected
 B - Possible blank contamination
 G - The Sample MDC is greater than the requested RL
 H - High bias
 HF - Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
 J - The identification of the analyte is acceptable; the reported value is an estimate
 K - Unknown bias
 L - Low bias
 Q - Detected below the quantitation limit
 R - Quality Control indicates that data are unusable for all purposes
 * - LCS or LCSD exceeds the control limits
 NP - Not Published
 NA - Not Applicable
 mg/L - milligrams per Liter. Milligrams per liter are equivalent to parts per million.
 pCi/L - picocuries per Liter
 Maximum Contaminant Levels (MCLs) are standards that are set by the United States Environmental Protection Agency (EPA) for drinking water
 An MCL is the legal threshold limit on the amount of a substance that is allowed in public water systems under the Safe Drinking Water Act.
 New Mexico Water Quality Control Commission Standard (NMWQCC) Health-based standards applicable to groundwater with less than
 10,000 mg/L Total Dissolved Solids (TDS). For metals contaminants, these standards apply to dissolved metals.





LEGEND

 Existing Monitor Well
(Phase I Sample Location)

CERCLIS ID: NMN000606847
TDD NO:
19/WESTON-042-13-001
35/WESTON-042-14-001

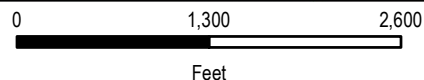
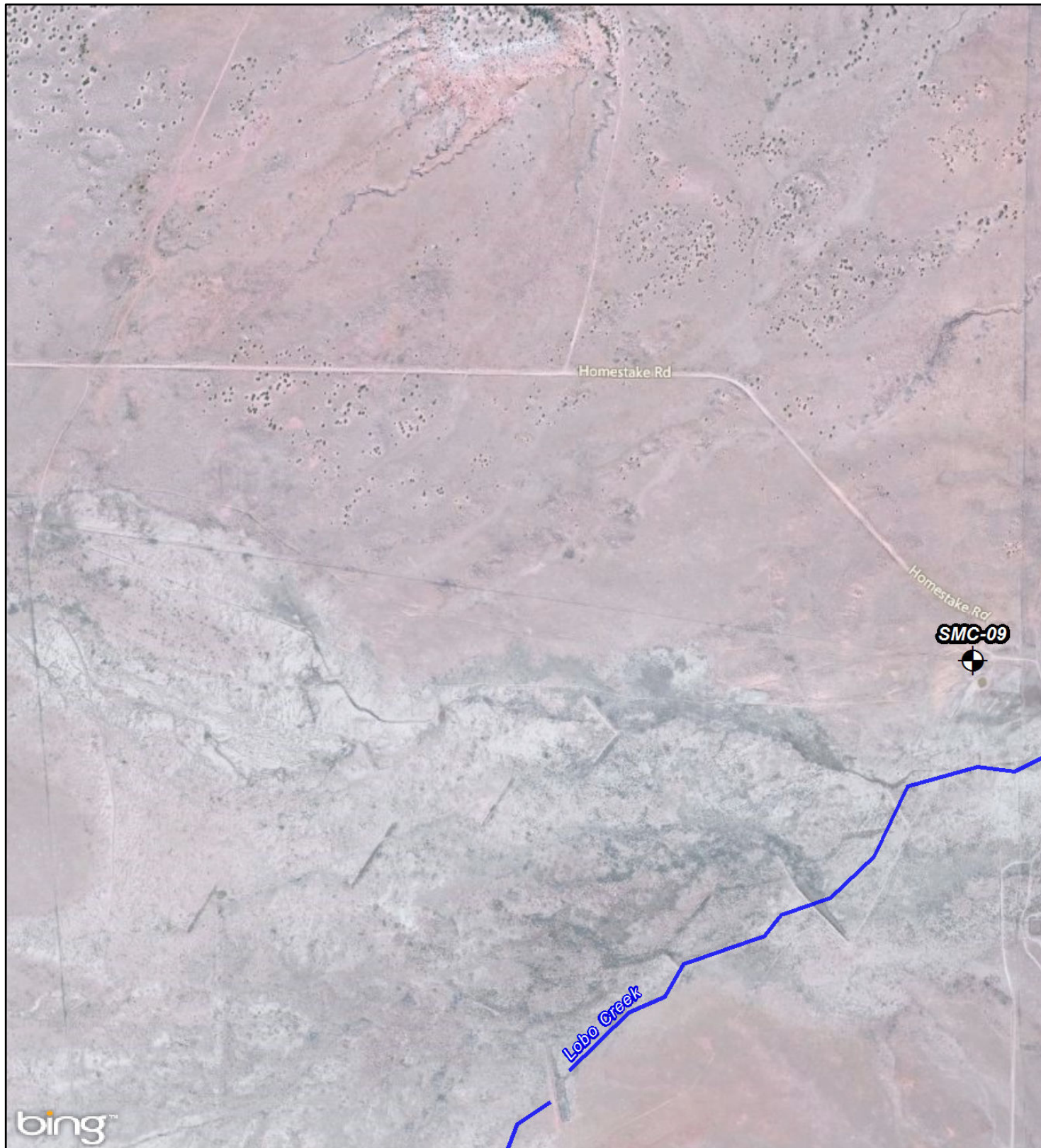
SOURCE: (c) Microsoft Bing and its data suppliers, 2014



USEPA REGION 6

FIGURE 1
WELL PV-01 AND SMC-10
SAN MATEO CREEK BASIN LEGACY URANIUM
CIBOLA & MCKINLEY COUNTIES, NM

DATE	PROJECT NO	SCALE
JUN 2015	20406.012.019.0833.01 20406.012.035.0846.01	AS SHOWN




USEPA REGION 6

FIGURE 2
WELL SMC-09
SAN MATEO CREEK BASIN LEGACY URANIUM
CIBOLA & MCKINLEY COUNTIES, NM

DATE	PROJECT NO	SCALE
JUL 2015	20406.012.019.0833.01 20406.012.035.0846.01	AS SHOWN

LEGEND

 Existing Monitor Well
 (Phase I Sample Location)

CERCLIS ID: NMN000606847
 TDD NO:
 19/WESTON-042-13-001
 35/WESTON-042-14-001

SOURCE: (c) Microsoft Bing and its data suppliers, 2014



Natural & Depleted Uranium - ToxFAQs™

CAS # 7440-61-1

This fact sheet answers the most frequently asked health questions (FAQs) about natural and depleted uranium. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

HIGHLIGHTS: Natural uranium is a naturally occurring chemical substance that is mildly radioactive. Depleted uranium is an adjusted mixture of natural uranium isotopes that is less radioactive. Everyone is exposed to low amounts of uranium through food, water, and air. Exposure to high levels of natural or depleted uranium can cause kidney disease. Uranium has been found in at least 67 of 1,699 National Priorities List (NPL) sites identified by the Environmental Protection Agency (EPA).

What is uranium?

Uranium is a naturally occurring radioactive element. It is naturally present in nearly all rocks, soils, and air; can be redistributed in the environment through wind and water erosion; and more can be released into the environment through volcanic eruptions. Natural uranium is a mixture of three isotopes: ^{234}U , ^{235}U , and ^{238}U . The most common isotope is ^{238}U ; it makes up over 99% of natural uranium. All three isotopes behave the same chemically, but they have different radioactive properties. The half-lives of uranium isotopes (the amount of time needed for half of the isotope to give off its radiation and change into a different element) is very long. The least radioactive isotope is ^{238}U with a half life of 4.5 billion years. Depleted uranium is a mixture of the same three uranium isotopes except that it has very little ^{234}U and ^{235}U . It is less radioactive than natural uranium. Enriched uranium is another mixture of isotopes that has more ^{234}U and ^{235}U than natural uranium. Enriched uranium is more radioactive than natural uranium.

Uranium is almost as hard as steel and much denser than lead. Natural uranium is used to make enriched uranium; depleted uranium is the leftover product. Enriched uranium is used to make fuel for nuclear power plants. Depleted uranium is used as a counterbalance on helicopters rotors and airplane control surfaces, as a shield to protect against ionizing radiation, as a component of munitions to help them penetrate enemy armored vehicles, and as armor in some parts of military vehicles.

What happens to uranium when it enters the environment?

- Natural and depleted uranium that exist in the dust in the air settle onto water, land, and plants. Uranium deposited on land can be reincorporated into soil, washed into surface water, or stick to plant roots. Uranium in air, surface water, or groundwater can be transported large distances.

How might I be exposed to uranium?

- Food and drinking water are the primary sources of intake for the general public. Very low levels of uranium are found in the air.
- Root crops such as potatoes, parsnips, turnips, and sweet potatoes contribute the highest amounts of uranium to the diet. Because uranium in soil can stick to these vegetables, the concentrations in these foods are directly related to the concentrations of uranium in the soil where the foods are grown.
- In most areas of the United States, low levels of uranium are found in the drinking water. Higher levels may be found in areas with elevated levels of naturally occurring uranium in rocks and soil.
- People may be exposed to higher levels of uranium if they live near uranium mining, processing, and manufacturing facilities. People may also be exposed if they live near areas where depleted uranium weapons are used.

How can uranium enter and leave my body?

Most of the uranium you breathe or ingest is not absorbed and leaves the body in the feces. Absorbed uranium is deposited throughout the body. The highest levels are found in the bones, liver, and kidneys; 66% of the uranium in the body is found in your bones. It can remain in the bones for a long time; the half-life of uranium in bones is 70–200 days. Most of the uranium that is not in bones leaves the body in the urine in 1–2 weeks.

How can uranium affect my health?

Natural uranium and depleted uranium have the identical chemical effect on your body. Kidney damage has been seen in humans and animals after inhaling or ingesting

Natural and Depleted Uranium

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uranium compounds. However, kidney damage has not been consistently found in soldiers who have had uranium metal fragments in their bodies for several years. Ingesting water-soluble uranium compounds will result in kidney effects at lower doses than following exposure to insoluble uranium compounds.

Studies in animals have shown that inhalation exposure to insoluble uranium compounds can result in lung damage. In male rats and mice, exposure to uranium has been shown to decrease fertility. Uranium compounds on the skin caused skin irritation and mild skin damage in animals.

Health effects of natural and depleted uranium are due to chemical effects and not to radiation.

How likely is uranium to cause cancer?

Neither the National Toxicology Program (NTP), the International Agency for Research on Cancer (IARC) nor the EPA have classified natural uranium or depleted uranium with respect to carcinogenicity.

How can uranium affect children?

The health effects seen in children from exposure to toxic levels of uranium are expected to be similar to the effects seen in adults.

Exposure of animals to high levels of uranium during pregnancy, which caused toxicity in the mothers, has induced early deaths and birth defects in the young. It is not clear if this can happen in the absence of effects on the mother. We do not know whether uranium can cause birth defects in people. There are some studies that suggest that exposure to depleted uranium increased the frequency of birth defects, but the studies are deficient to allow valid conclusions.

How can families reduce the risk of exposure to uranium?

- Avoid eating root vegetables grown in soils with high levels of uranium. Consider washing fruits and vegetables grown in that soil and discard the outside portion of root vegetables.

- Consider having your water tested if you suspect that your drinking water might have elevated levels of uranium; if elevated levels are found, consider using bottled water.

Is there a medical test to determine whether I've been exposed to uranium?

Natural uranium is in your normal diet, so there will always be some level of uranium in all parts of your body. If depleted uranium is present, it adds to the total uranium level. Uranium can be measured in blood, urine, hair, and body tissues. Most tests are for total uranium; however, expensive tests are available to estimate the amounts of both natural and depleted uranium that are present.

Has the federal government made recommendations to protect human health?

The government has made recommendations for uranium which apply to natural and depleted uranium combined.

The EPA established a maximum drinking water contaminant level of 0.03 mg/L.

The Occupational Safety and Health Administration (OSHA) has limited workers' exposure in air to an average of 0.05 mg U/m³ for soluble uranium and 0.25 mg U/m³ for insoluble uranium over an 8-hour workday.

The National Institute for Occupational Safety and Health (NIOSH) recommends workers exposure be limited to 0.05 mg U/m³ of air for soluble uranium and 0.2 mg U/m³ for insoluble uranium averaged over a 10-hour workday and recommends that exposure to soluble uranium not exceed 0.6 mg U/m³ for more than 15 minutes.

The Nuclear Regulatory Commission (NRC) has established air concentration limits for uranium and its individual isotopes that apply to occupational exposure and releases from facilities.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 2013. Toxicological Profile for Uranium. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30333.

Phone: 1-800-232-4636.

ToxFAQs™ Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaqs/index.asp>.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.